Section II. (Amendments to the Claims)

[NOTE: The following amendments effect revision of the claims, proceeding from claims 1-36 of the international patent application as pending at the conclusion of international proceedings, and accompanying the International Preliminary Report on Patentability issued February 7, 2006 by the International Preliminary Examining Authority of the Australian Patent Office (IPEA/AU). A copy of such IPRP (Form PCT/IPEA/409) and accompanying claims 1-36 is enclosed and submitted herewith.]

Please cancel claims 1-36, and add new claims 37-72, as set out below in the listing of claims 1-72 of the application.

1.-36. (Cancelled).

37. (New) A sensor for measuring gas permeability of a test material, comprising:

an electrically conductive sensing element that comprises a water and/or oxygen sensitive material, wherein the reaction of said material with water or oxygen when the sensing element is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element,

two electrodes electrically connected to the sensing element,

a base substrate that supports the sensing element, and

a liner layer interdisposed between the sensing element and the base substrate.

38. (New) The sensor of Claim 37, wherein the electrodes provide electrical connection between the sensing element and an electrical signal evaluation means.

39. (New) The sensor of Claim 37, wherein the water and/or oxygen sensitive material is selected from the group consisting of a conductive organic polymer, metal, metal alloy, metal oxide, and mixtures and combinations thereof.

40. (New) The sensor of Claim 39, wherein the metal is selected from the group consisting of calcium and magnesium.

41. (New) The sensor of Claim 39, wherein the conductive organic polymer is selected from the group consisting of polyaniline, polypyrrole and polythiophene, polyacetylene, poly-p-phenylene, and polyvinylpyridine, thiophene-bipyridine copolymers, polypyridine, polybipyridine, and organometallic polyphenylenes.

42. (New) The sensor of Claim 39, wherein the metal oxide is selected from the group consisting of VO_2, CrO_2, MoO_2, $LiMn_2O_4$, Cd_2SnO_4, $CdIn_2O_4$, Zn_2SnO_4 and $ZnSnO_3$, and $Zn_2In_2O_5$.

43. (New) The sensor of Claim 37, wherein the electrodes comprise an electrically conductive material selected from the group consisting of a metal, metal oxide and mixtures and combinations thereof.

44. (New) The sensor of Claim 43, wherein the metal is selected from the group consisting of silver, gold, aluminium and copper.

45. (New) The sensor of Claim 43, wherein the metal oxide is selected from the group consisting of indium tin oxide, aluminium zinc oxide, and indium zinc oxide.

46. (New) The sensor of Claim 45, wherein the base substrate comprises a polymeric material.

47. (New) The sensor of Claim 46, wherein the polymeric material comprises an organic polymer selected from the group consisting of polycarbonate, polyethylene, polythersulfone, epoxy resins, polyethylene terephthalate, polystyrenes, polyurethanes and polyacrylates.

48. (New) The sensor of Claim 46, wherein the polymeric material comprises an inorganic polymer selected from the group consisting of silicones, polydimethylsiloxanes, biscyclopentadienyl iron, polydichlorophosphazene and derivatives thereof.

49. (New) The sensor of Claim 45, further comprising a barrier layer formed on the base substrate.

50. (New) The sensor of Claim 49, wherein the barrier layer comprises a material selected from the group consisting of metals, metal oxides, ceramic oxides, inorganic polymers, organic polymers and mixtures and combinations thereof.

51. (New) The sensor of Claim 37, wherein the electrodes are located on a surface of the substrate.

52. (New) The sensor of Claim 51, wherein the electrodes are spaced apart, thereby forming a trench.

53. (New) The sensor of Claim 52, wherein the sensing element is located in the trench.

54. (New) The sensor of Claim 37, further comprising an encapsulation enclosing the sensing element.

55. (New) The sensor of Claim 54, wherein the encapsulation comprises a polymeric material selected from the group consisting of epoxy polymers, polysulfide, silicone and polyurethane.

56. (New) The sensor of Claim 55, wherein the encapsulation provides a hollow space around the sensing element.

57. (New) The sensor of Claim 56, wherein the hollow space is filled with an inert gas.

58. (New) The sensor of Claim 54, further comprising a cover substrate, wherein the encapsulation is formed as side (lateral) walls surrounding the sensing element, and the cover substrate is arranged to be in contact with the side (lateral) walls.

59. (New) The sensor of Claim 58, wherein the cover substrate comprises a material selected from the group consisting of glass, aluminium and copper.

60. (New) The sensor of Claim 37, further comprising a protective layer covering at least a portion of the sensing element.

61. (New) The sensor of Claim 60, wherein the protective layer comprises a material selected from the group consisting of a metal, a metal alloy, a metal oxide, a metal oxide mixture, a metal fluoride and an organic polymer.

62. (New) The sensor of Claim 61, wherein the metal fluoride is selected from the group consisting of LiF and MgF_2.

63. (New) The sensor of Claim 37, wherein the liner layer comprises an organic polymer.

64. (New) The sensor of Claim 63, wherein the organic polymer is substantially permeable to gas.

65. (New) The sensor of Claim 63, wherein the organic polymer is selected from the group consisting of acrylic polymers, and parylene type polymers.

66. (New) The sensor of Claim 37, wherein the liner layer comprises an inorganic polymer.

67. (New) The sensor of Claim 66, wherein the inorganic polymer comprises a silicone-based polymer.

68. (New) A method of producing a sensor for measuring gas permeability of a test material, said method comprising:
providing a base substrate that supports a sensing element and that further comprises a liner layer,

depositing on the liner layer an electrically conducting sensing element that comprises a water and/or oxygen sensitive material so that the liner layer is interdisposed between the base substrate and the sensing element

providing two electrodes, and

connecting the electrically conductive sensing element to said pair of electrodes.

69. (New) The method of Claim 68, wherein the electrodes are deposited on a surface of the substrate.

70. (New) A system for measuring the gas permeability of a test material, said system comprising a sensor for detecting moisture permeation through the test material, said sensor comprising:

an electrically conductive sensing element that comprises a water and/or oxygen sensitive material, wherein the reaction of said material with water or oxygen when the sensing element is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element, and

two electrodes electrically connected to the sensing element, wherein the electrodes provide electrical connection between the sensing element and an electrical signal evaluation means,

a base substrate that supports the sensing element, and

a liner layer interdisposed between the sensing element and the base substrate.

71. (New) A method of determining the gas permeability of a test material using a sensor for measuring gas permeability of the test material, said sensor comprising:

an electrically conductive sensing element that comprises a water and/or oxygen sensitive material, wherein the reaction of said material with water or oxygen when the sensing element is contacted with water and/or oxygen results in a change in the electrical conductivity of the sensing element, and

two electrodes electrically connected to the sensing element, wherein the electrodes provide electrical connection between the sensing element and an electrical signal evaluation means,

a base substrate that supports the sensing element, and

a liner layer interdisposed between the sensing element and the base substrate

wherein said method comprises:

contacting the sensing element with water and/or oxygen;

measuring the changes in electrical conductivity of the sensing element over a period of time; and

calculating the gas permeability coefficient of the test material based on the measurements.

72. (New) The method of Claim 71, further comprising measuring the change in 1/f type noise spectrum density over the period of time.